

INTER COUNTY RIVER IMPROVEMENT
CHIEF ENGINEER'S REPORT FOR THE YEAR
1949

January 25, 1950

TO THE JOINT BOARD,
INTER COUNTY RIVER IMPROVEMENT
KING AND PIERCE COUNTIES, WASH.

GENTLEMEN:

The following report covering a twelve month period of maintenance operation along the Inter County River improvement channel extending from the City limits of Tacoma to the Muckelshoot Indian Reservation, a distance of approximately 15 miles, is hereby submitted for your consideration and approval.

WEATHER CONDITIONS

Thruout the year the weather has followed a quite normal pattern without perceptible extremes. The heavy snow blanket covering the water shed of these rivers during early spring melted slowly, consequently, the runoff extended over a longer period and well into the summer months.

For the record the following table of average monthly weather conditions is hereby included.

Tabulated Climatological Data for the year covering the area within the province of this flood maintenance project.

Month	Total Precipitation in inches	No. Days Rain	Max. Temp.	Min. Temp.
January	1.01	7	49	9
February	7.39	18	62	14
March	3.35	14	62	26
April	3.02	14	75	31
May	1.70	6	80	33
June	2.54	10	84	38
July	1.39	9	90	38
August	1.22	6	90	46
September	1.78	8	83	37
October	5.73	12	66	28
November	7.96	17	67	32
December	7.69	21	57	15

During December snow fell on 8 days.

U. S. ENGINEER'S PROJECT LOWER PUYALLUP RIVER

U. S. Engineer Flood Control project on the lower Puyallup River channel included 1800 lineal feet of Inter County River Improvement channel and a major portion of the river channel thru the city of Tacoma to Commencement bay has been practically completed with the exception of a small portion of rock revetment yet to be placed.

The dredging performed on this project was designed to straighten and deepen the river channel which should for the present at least, prevent excessive shoaling on the channel floor. The straightening of the old channel should greatly facilitate a rapid runoff during peak flood periods.

This dredging operation within the tide water area of the channel will no doubt cause a scouring effect thruout the river channel for probably several miles up stream, thereby

reducing the islands and shoals that are in evidence in many places.

This shoaling effect on the channel floor is of minor importance during normal seasons, however, when major floods occur and the channel capacity is taxed to the extreme limit it is then that two, three or more feet built up on the channel floor will reduce ~~channel~~ capacity to a point where the free board margin is very narrow.

The gradient over which these mountain streams flow is extremely pronounced, consequently, this steep gradient results in severe scour on the channel floor, especially thruout the upper reaches from the glaciers down to near the King-Pierce County line, where a pronounced reduction in gradient occurs. The heavier river borne rocks and gravel are deposited thruout this area while the finer gravel, sand and silt are carried on down stream to be deposited at various locations in proportion to stream velocity and the weight of sand and silt particles carried. This movable river borne material is an ever present factor which cannot be neglected, for its occurrence in the channel, if not periodocally removed, will result in the over topping of the levees during peak flood periods.

NATURE AND EXTENT OF MAINTENANCE OPERATION PERFORMED DURING 1949

1. MUCKELSHOOT SECTION- During 1948 the accumulated drift wood was collected and burned thruout this entire section of the river channel and also a considerable amount of dredging

was done in an effort to confine the river within a reasonable limit. This operation proved quite successful to the extent that no additional maintenance was required thruout the present year.

2. AUBURN SECTION- Constant vigil is maintained along the Auburn concrete diversion dam to prevent the river from undercutting this old structure. Since the construction of this dam in 1914 the bed of the river channel adjacent thereto has scoured out to a depth of at least seven feet below the footing of the dam. The near destruction of this dam by scour action during 1919 and again in 1933 made it imparative that proper heavy revetment be placed along the toe of this dam and an effort be made to divert the course of the river away from this structure. Numerous spur dikes have been built that have accomplished the desired result and with the exception of the lower two hundred feet the river at the present time is flowing well away from the base of this dam. We anticipate building at least two more rock spur dikes that will no doubt protect the entire length of this very important structure.

During the year we have rented a dozer to collect and burn drift and do some dredging work at a cost of \$530.44.

3. COUNTY LINE SECTION- As elsewhere mentioned in this report the County Line Section is at the base of the long steep gradient which extends upstream to the base of the mountain, it is here that a great volume of river borne rock, gravel and sand accumulates as a result of the decreased velocity.

Thruout this immediate area there is at present a great amount of this river borne material that must be removed if channel capacity is to be maintained. For the past three or four years we have been observing the rapid building up of the channel floor and have anticipated its removal, the amount being so large that it was decided that it would be advisable to purchase a tractor equipped with dozer blade and a double - drum dragline attachment with which to dredge the channel. The purchase of this equipment was consumated in December of this year. The rental of similar equipment to do the necessary stream dredging which must of necessity extend over a period of at least four years , would be sufficient to offset the initial purchase price of a tractor equipped as the one purchased.

During the year we assisted the King County Health Department in cleaning up a garbage dump that had been accumulating for a number of years on the right bank of the river in the vicinity of Pacific City. We have constructed a permanent barrier over the river dike so that in the future all garbage will be disposed of in the area provided for by the Health Department.

4. DIERINGER SECTION - Thruout this section of the river several quite extensive lateral erosion pockets developed that required some immediate repair, however, the completion of this work has been deferred until the summer months of the ensuing year when low water will make it possible to do this repair work at a minimum cost.

At Stewart Road Bridge at Station 650+70 and extending down stream approximately 300 feet it became necessary to remove a portion of the gravel that had accumulated on the bed of the stream to a depth that prevented the operation of the U. S. Gaging station. This dredging operation was performed at a cost of \$247.48.

At Station 598+00 to 600+00 an access road to the river was rebuilt at a cost of \$128.60.

At Station 628+70 on the left bank a rock groin was built requiring 440 cubic yards of rock. This work was performed at a cost of \$1674.42.

At Station 558+00 on the right bank of the river a rock groin was placed requiring 360 cubic yards of rock at a total cost of \$1107.84.

At Station 610+00 to Station 630+00 on the right bank of the river a rock blanket was placed requiring 280 cubic yards of rock at a total cost of \$1003.52.

At Station 482+80 to Station 488+00 brush growing on the bank of the river was removed at a cost of \$134.40.

5. ROESLI SECTION- The removal of brush on the bank of the river at the following locations were performed during this year;

Right bank-	Station 408+00 to 414+00
Left Bank	" 368+00 to 374+00
Left Bank	" 410+00 to 412+00

At a total cost of \$351.47

On the left bank of the river at Station 342+80 a rock groin was constructed during 1948 to replace an ancient pile bulkhead that had decayed and that no longer protected

the river bank at this point. It was found necessary to extend this rock groin some distance farther out into the river channel, 1644 cubic yards of rock was placed in this groin at a total cost of \$3320.01.

At Station 412+00 on the left bank of the stream there was a tendency to heavy erosion which was cutting deeper and deeper into the banks of the river at this point. A rock groin was started placing 608 cubic yards of rock at a cost of \$1243.14. A dozer was rented and used to construct an access road to this point at a cost of \$240.00.

At Station 411+00 a short groin was also constructed on the left bank requiring 572 cubic yards of rock at a total cost of \$1094.76.

6. PUYALLUP, MURPHY AND RESERVATION SECTIONS - These three sections taken as a unit represent a more nearly uniform river channel which to date remains quite well revetted with the old original concrete slab with probably one exception occurring on the left bank at Station 242+00 to 267+00. At this point during the years 1917 to 1919 floods occurring that time destroyed approximately 2500 lineal feet of the levee that had previously been constructed. During the ensuing years some effort had been made to replace the eroded levee, however, no effort had been made to completely rebuild the old original levee. During the past four years we have begun to reestablish channel alignment and to rebuild the toe of the levee by constructing a rock groin gradually building it to a height that will prevent overflow during normal periods. This work will be continued from time to time as funds permit.

From the City limits of Tacoma to the upstream terminun of the Puyallup Section a distance of approximately six miles, we have concentrated our efforts in removing all brush growth along the banks of the river during the past year.

An urgent request had been made by the U. S. District Engineer office at Seattle that this brush growth be kept cut low so that in event of an extreme flood a maximum channel capacity could be maintained. The removal of a considerable quantity of brush such as occurs on the river banks entails considerable expense when performed by hand labor, therefore, we have attempted to destroy this brush growth by chemical treatment, the result of this effort cannot be fully determined until early spring, but if present indications are a safe criterion we may be assured that this method will be less costly than hand labor.

The cost to remove brush by hand labor for a distance of 6.4 miles is \$3,317.36, by comparison 2.4 miles of brush growth as chemically treated at a cost of \$95.00 for material.

ANTICIPATED MAINTENANCE NECESSARY DURING YEAR 1950

1. Muckelshoot Section- 12.5 miles in length

Collecting and burning accumulated driftwood in the river channel.

2. Auburn Section- 1.6 miles in length

a- Collecting and burning accumulated driftwood in river channel.

b- Building a short rock spur dike on the right bank near the lower end of the concrete Diversion Dam

c- Channel dredging, near the Highway Bridge where a great amount of gravel has accumulated in the channel.

3. County Line Section - 1.29 miles in length

It is in this section that a great amount of river borne gravel has accumulated until at present it presents a hazard of no mean proportion. It is within this section that the gradient changes rapidly with the result that precipitation of river borne material is most noticeable. During the years 1933 to 35 approximately 200,000 cubic yards of gravel was dredged from the channel near the King-Pierce County line in an effort to remove this vast amount of accumulated material. Since that time accumulation has continued until at present it appears that dredging operation should not be longer deferred.

4. Dieringer Section 3.57 miles in length.

Immediately below the County Line Section the silting action on the channel floor has been quite pronounced to the extent that large shoals and islands are occurring causing considerable lateral erosion to the unrevetted banks. As in the County Line Section it becomes increasingly necessary to remove this accumulation of gravel as soon as equipment can be made available.

Thruout the Dieringer Section of the river a considerable portion of the banks remain unrevetted and the stabilization of these river banks has been deferred from year to year with work being performed at such places where erosion to the natural bank made it necessary, this naturally results in widely scattered improvement to the existing banks.

Several quite severe erosion pockets developed during the year which required some immediate attention, these will be

completed during the ensuing year.

5. Roesli Section- 2.10 miles in length

The confluence of the Puyallup and Stuck Rivers occurs within this section and it is at this point that wide channel diversion has occurred with the result that the primary meander belt varies in width from 800 to 1,000 feet thus permitting the river to flow from side to side and at times to attempt further destruction to the unrevetted banks.

As in the Dieringer Section no attempt has been made to provide a continuously revetted bank as this would necessitate the expenditure of funds considerably in excess of our annual maintenance budget. We have however adopted a plan of progressive action, by building a uniform channel width and revetting this with rock as the levees are built. It is possible to dredge the river channel using this material to build the levees.

6. Puyallup Section 1.15 miles in length

The right bank of the channel thruout this section remains in a good state of repair having been stabilized with a continuous concrete slab many years ago. The left hand bank for the most part consists of a wide gravel slope heavily overgrown with willow and cotton wood brush which has resisted erosion over the years. Unless some unpredicted erosion should occur we may consider this section in a safe condition at least for the present.

7 and 8. Murphy and Reservation Sections- 4.84 miles in length

We may consider these two sections as a single unit since this portion of the river channel was dredged and revetted with

a concrete slab during the initial construction period of the Inter County project.

Thru the years since then, undercutting and overtopping of the levee during peak flood period has necessitated the rebuilding portions of the levee. Erosion at the waters edge of the concrete slab revetment has from time to time necessitated some extensive rock work to prevent the river from undercutting this slab revetment. To accomplish this nenerous short spur dikes have been built that extend out from the shore line twenty to thirty feet. Thus far this type of protection has proven very satisfactory. where the erosion has been continuous over several hundred feet in length a rock blanket has been employed extending out from the toe of the concrete slab onto the river floor. This type of work will be continued as occasion demands.

EQUIPMENT

A careful survey of our requirements and especially the amount of maintenance work necessary within the next four or five years, it became apparent that we should purchase a diesel tractor equipped with a dozer blade and double-drum winch for drage line work, rather than to continue to rent equipment of this type. This matter was thoroughly discussed with our Consulting Engineer, who voiced his approval to purchase this equipment.

GENERAL

The transfer of the Inter-County River Improvement office from its former location on Stewart Road and Stuck River to its new location on the Puyallup River at Meridian Street in Puyallup was accomplished during the past year. As previously stated on numerous occasions, the old office building was in

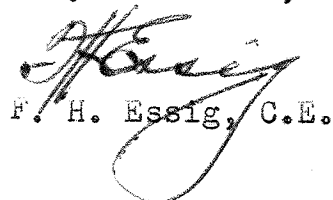
a bad state of decay and since it was located beneath two high voltage transmission lines of the Puget Sound Power and Light Company we had been requested to remove it at our earliest convenience due to the hazard to both the building and to occupants should one of these high voltage lines break.

During the summer months of 1949 we built the present office of concrete and concrete blocks on land belonging to the Inter County River Improvement. This building is very substantial and is well designed to meet the requirements of an office of this kind for the duration of the Inter County River Improvement 99 year agreement. The cost of this building including labor and material amounted to \$8,354.99.

As your Chief Engineer I am most happy to have the advice and council of the newly appointed Consulting Engineer Mr. J. A. Earley, whose training and engineering experience over a period of many years combined with his first hand information relative to the Inter County River Improvement gained while serving as a King County Commissioner has provided him with the necessary prerequisites to serve as a Consulting Engineer on this river project in which two adjacent counties are so vitally interested.

A financial statement of the years expenditures is included herewith.

Respectfully submitted,


F. H. Essig, C.E.

Seattle, Washington
February 6, 1950

To the Joint Board
Inter County River Improvement
King and Pierce Counties, Washington

Gentlemen:

Attached hereto is the annual report of the Inter County River Improvement, compiled by Mr. F. H. Essig, Chief Engineer on this project.

From examination on the ground and of the maps, I find the report to be substantially correct. I find that Mr. Essig is well equipped, through years of training and experience, to handle a project of this character which requires careful judgment at times.

I was fully in accord with the purchase of tractor equipment in the 1949 budget, as I am of the opinion that the removal of the gravel and sand deposits mentioned in Sec. 3 - "County Line Section" should not be delayed another season. Due to the reduction in the gradient of the river which occurs at about the Auburn Bridge, it will be necessary to remove deposits almost yearly. Consequently it was our opinion that it would be more economical to buy equipment than to rent. It is also our observation that when flood water is impounded in the White River dam reservoir and then released after a quick run-off, the river at these times carries a large amount of silt, which adds to the burden of removal. It can be safely said that control of glacial streams such as the White, Puyallup and other such streams, will go on forever.

I wish to commend Mr. Essig for the weighing method he has installed at the Orting Rock Quarry. All rock removed by dump truck is weighed and a daily record kept of each truck operating. Due to the fact that practically all trucks are hired on an hourly basis, it can be seen at a glance the units that are operating efficiently and vice versa.

I cannot stress too strongly the necessity of working with the river and the placing of rock groins in proper locations, using as large bi-angular rock as can be handled. It is my opinion that rock rip rap of proper size and hardness is, in the long run, the cheapest form of revetment and bank protection, as piling and timber and brush are short-lived to say the least.

Very truly yours,


J. A. Earley
Consulting Engineer

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INTER COUNTY RIVER IMPROVEMENT

1949 EXPENDITURES

Office- Engineering	\$ 8,069.57
Stream Gaging	550.00
Tools-Shopwork-Repair	401.86
Ford Flat Truck- Operating Cost & Repair	378.62
Dodge Truck " " "	240.86
Mercury Car " " "	383.69
River Patrol-Bank Stabilization	29,575.76
Industrial Insurance	423.31
Employer's Retirement Contribution	553.67
New Office Construction	8,354.99
Access Roads	297.92
Cross Section & Survey-Drafting	744.14
Dozer Supplies	89.41
Capital Outlay Caterpillar Tractor DozerBlade	<u>20,134.44</u>
Total.....	\$70,198.24
Total vouchers issued	<u>70,337.26</u>
Gas-Oil Inventory.....	\$ 139.02

	BUDGET FOR 1949			
	SALARIES & WAGES	MAINTENANCE & OPERATION	CAPITAL OUTLAY	TOTAL
	\$28,300.00	\$23,300.00	\$21,500.00	
			<u>8,500.00</u>	
			\$30,000.00	\$81,600.00
Total				
Expended	<u>24,763.58</u>	<u>17,084.25</u>	<u>28,489.43</u>	<u>70,337.26</u>
Balance	\$ 3,536.42	6,215.75	1,510.57	\$11,262.74
	King County Budget		Pierce Co. Budget	Total Budget
	\$60,960.00		\$20,640.00	\$ 81,600.00
Expenditures	<u>50,566.89</u>		<u>19,770.37</u>	<u>70,337.26</u>
	\$ 9,393.11		\$ 869.63	\$11,262.74